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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/465,131	12/16/1999	SARATHY RAJAGOPALAN	65611	8489

24319 7590 12/09/2002

LSI Logic Corporation
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EXAMINER

GUADALUPE, YARITZA

ART UNIT PAPER NUMBER

2859

DATE MAILED: 12/09/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/465,131

Applicant(s)

RAJAGOPALAN ET AL.

Examiner

Yaritza Guadalupe

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 October 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

In response to Appeal Brief filed October 15, 2002

**REOPENING OF PROSECUTION –
NEW GROUND OF REJECTION AFTER APPEAL**

1. In view of the Appeal Brief, paper no. 19, filed on 30 April 2002, PROSECUTION IS HEREBY REOPENED. A new ground of rejection is set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

- (a) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,
- (b) request reinstatement of the appeal.

If reinstatement of the appeal is requested, such request must be accompanied by a supplemental appeal brief, but no new amendments, affidavits (37 CFR 1.130, 1.131 or 1.132) or other evidence are permitted. See 37 CFR 1.193(b)(2).

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1 and 4 - 5 are finally rejected under 35 U.S.C. 103 (a) as being unpatentable over the Admitted Prior Art [Hereinafter APA] in view of Wyland (US 5,997,174).

of the specification

APA discloses a thermal profiling device (See page 2, line 5_A as amended on May 11, 2001) comprising a packaging substrate having an upper surface, and a semiconductor die having an active circuit surface secured directly to the upper surface of the packaging substrate. APA also discloses the semiconductor die including an active circuit surface having conductive bumps and the substrate including a plurality of bonding pads formed on the surface and where the semiconductor die is positioned on the substrate such that the conductive bumps are in electrical contact with the bonding pads. APA discloses the substrate and semiconductor die secured in place by a solder bond between the bumps and the bonding pads, securing the thermocouple in position.

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APA does not disclose the thermocouple secured directly to the active circuit surface of the semiconductor die as stated in claim 1. However, APA discloses in page 2 of the Specification that the interface temperature between the active circuit surface of a semiconductor die and a substrate is critical during thermal profiling and therefore, enhancements for measuring this interface temperatures are needed.

With respect to claim 1 : APA discloses a flip chip assembly as stated above. Wyland discloses a thermal system for a semiconductor die comprising a thermocouple (117) secured on the junction between surfaces (113, 114) for measuring and controlling a junction / interface temperature. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to provide a thermocouple secured to the semiconductor die for measuring the junction / interface temperature as taught by Wyland between the active circuit surface and the substrate disclosed by APA in order to avoid damages due to over heating / over cooling that may affect the overall quality of the circuit and since APA suggests that more accurate measurements of the interface temperature are required.

4. Claim 6 is finally rejected under 35 U.S.C. 103 (a) as being unpatentable over the Admitted Prior Art [Hereinafter APA] in view of Wyland (US 5,997,174) and further in view of Lemoine et al. (US 5,585,577).

APA and Wyland disclose a device as stated in paragraph 3 above.

APA and Wyland do not disclose the opening passing through the second opposite surface and through the first surface of the packaging substrate as stated in claim 6.

With respect to claim 6 : APA and Wyland disclose a system comprising a thermocouple secured to the semiconductor die as stated above but do not disclose an aperture through the substrate. Lemoine et al. discloses an apparatus having a temperature sensor (32) inserted through a hole / opening (40) in the substrate (10) to locate the sensor directly to a surface / interface to be measured. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to use an opening through the substrate for inserting the thermocouple to be secured directly to the surface as taught by Lemoine et al. in the device disclosed by APA and Wyland since Lemoine is teaching an alternate way to position the thermocouple in order to provide a mechanism to obtain the real temperature of the semiconductor die.

5. Claims 2 – 3 are finally rejected under 35 U.S.C. 103(a) as being unpatentable over the Admitted Prior Art [Hereinafter APA] in view of Wyland (US 5,997,174), as applied to claims 1, 4 and 5 above, and further in view of Thorson et al. (US 6,131,579).

APA and Wyland disclose a flip chip assembly as stated in paragraph 3 above.

APA and Wyland do not disclose the thermocouple secured using an adhesive comprising epoxy as stated in claims 2 and 3.

Regarding claims 2 and 3 : Thorson et al. discloses a temperature sensing device having a thermocouple (250) and where an adhesive such as an epoxy (See Column 3, lines 63 – 65) is used in order to held the thermocouple in position. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to use an adhesive as taught by Thorson et al. in the apparatus disclosed by APA and Wyland in order to provide a mechanical protection for the thermocouple and provide an electrical conductor as well as a bonding mechanism.

Response to Arguments

6. Applicant's arguments with respect to claims 1 - 6 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Newman (US 5,035,514) discloses a thermal probe having a temperature sensor (20) for sensing the temperature at the interface temperature between a surface (22) and a medium.

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Jurkowski et al. (US 5,667,301) discloses a device having a thermocouple (T2) for measuring the interface temperature between surfaces (2a, 2b).

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yaritza Guadalupe whose telephone number is (703)305 -5676. The examiner can normally be reached on 9:00 AM - 6:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego F.F. Gutierrez can be reached on (703) 308-3875. The fax phone numbers for the organization where this application or proceeding is assigned are (703)308-7722 for regular communications and (703)308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.



Yaritza Guadalupe
Patent Examiner
Art Unit 2859
December 6, 2002

DIEGO F.F. GUTIERREZ
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